

THAT WHICH IS CLAIMED IS:

1 1. A method of enabling data access and manipulation from a  
2 pervasive device, comprising steps of:  
3 receiving a data access request from a pervasive device;  
4 obtaining the requested data;  
5 determining what data manipulation operations are available  
6 for the obtained data, as well as a location of each available  
7 data manipulation operation; and  
8 returning the determined data manipulation operations and  
9 locations to the pervasive device, in addition to the obtained  
10 data.

1 2. The method according to Claim 1, further comprising steps  
2 of:  
3 requesting operation of a selected one of the determined  
4 data manipulation operations; and  
5 performing the requested operation, wherein the performing  
6 step is executed by another device on behalf of the pervasive  
7 device.

1 3. The method according to Claim 1, wherein the determining  
2 step further comprises determining what data manipulation

3 operations are available for a content type of the obtained  
4 data.

1 4. The method according to Claim 3, wherein the determining  
2 step further comprises determining what data manipulation  
3 operations are available for a user of the pervasive device.

1 5. The method according to Claim 3, wherein the determining  
2 step further comprises determining what data manipulation  
3 operations are available for a current location of the pervasive  
4 device.

1 6. The method according to Claim 1, wherein the determining  
2 step further comprises determining what data manipulation  
3 operations are available for a user of the pervasive device.

1 7. The method according to Claim 6, wherein the step of  
2 determining what data manipulation operations are available for  
3 the user of the pervasive device further comprises obtaining  
4 information about the user from a protocol header of the data  
5 access request.

1 8. The method according to Claim 6, wherein the step of  
2 determining what data manipulation operations are available for  
3 the user of the pervasive device further comprises obtaining  
4 information about access privileges of the user.

1 9. The method according to Claim 8, wherein the information  
2 about access privileges of the user is obtained from a  
3 repository which stores access privilege information.

1 10. The method according to Claim 1, wherein the determining  
2 step further comprises determining what data manipulation  
3 operations are available for a user group of which a user of the  
4 pervasive device is a member.

1 11. The method according to Claim 1, wherein the determining  
2 step further comprises determining what data manipulation  
3 operations are available for a current location of the pervasive  
4 device.

1 12. The method according to Claim 11, wherein the step of  
2 determining what data manipulation operations are available for  
3 the current location of the pervasive device further comprises  
4 accessing a global positioning system ("GPS") function of the

5 pervasive device or a location registry associating the  
6 pervasive device with a plurality of access points.

1 13. The method according to Claim 1, wherein the determining  
2 step further comprises determining what data manipulation  
3 operations are available for the pervasive device.

1 14. The method according to Claim 13, wherein information used  
2 in the step of determining what data manipulation operations are  
3 available for the pervasive device is obtained from a protocol  
4 header which specifies types of content accepted by the  
5 pervasive device.

1 15. The method according to Claim 13, wherein information used  
2 in the step of determining what data manipulation operations are  
3 available for the pervasive device is obtained from a protocol  
4 header which specifies browser capabilities of a browser  
5 operating on the pervasive device.

1 16. The method according to Claim 13, wherein information used  
2 in the step of determining what data manipulation operations are  
3 available for the pervasive device is obtained by analyzing  
4 capability information provided by the pervasive device.

1 17. The method according to Claim 13, wherein information used  
2 in the step of determining what data manipulation operations are  
3 available for the pervasive device is obtained from a repository  
4 which specifies capabilities of the pervasive device.

1 18. The method according to Claim 2, wherein the requested  
2 operation is a file storage operation.

1 19. The method according to Claim 2, wherein the requested  
2 operation is a print operation.

1 20. The method according to Claim 2, wherein the requested  
2 operation is one of a fax operation, an e-mail operation, a  
3 project operation, or a voice mail application.

1 21. The method according to Claim 2, further comprising the  
2 step of annotating selected ones of the locations of the  
3 determined data manipulation operations with an identifier of  
4 respective ones of the obtained data.

1 22. The method according to Claim 2, further comprising the  
2 step of annotating selected ones of the returned data

manipulation operations and locations with one or more cookies  
which were present on the received data access request.

23. The method according to Claim 2, further comprising the  
step of annotating selected ones of the returned data  
manipulation operations and locations with one or more  
parameters for use by the performing step.

24. The method according to Claim 23, wherein a selected set of  
the parameters which are returned to the pervasive device and  
provided in the requesting step and are then used by the  
performing step.

25. The method according to Claim 23, wherein the annotating  
step is performed by a protocol proxy component which receives  
the data access request in the receiving step, and wherein the  
annotating step is performed prior to operation of the returning  
step.

26. The method according to Claim 25, wherein the determining  
and returning steps are performed by the protocol proxy.

1 27. The method according to Claim 25, wherein the protocol  
2 proxy receives requests and transmits responses using Hypertext  
3 Transfer Protocol ("HTTP") messages.

1 28. The method according to Claim 25, wherein the protocol  
2 proxy receives requests and transmits responses using Wireless  
3 Session Protocol ("WSP") messages.

1 29. The method according to Claim 25, wherein the protocol  
2 proxy receives requests and transmits responses using Simple  
3 Mail Transfer Protocol ("SMTP"), Post Office Protocol ("POP" or  
4 "POP3"), or Internet Message Access Protocol ("IMAP") messages.

1 30. The method according to Claim 25, wherein the protocol  
2 proxy receives requests and transmits responses using a  
3 synchronization protocol.

1 31. The method according to Claim 25, wherein the protocol  
2 proxy is configured to accept requests from the pervasive  
3 device.

1 32. The method according to Claim 25, wherein the protocol  
2 proxy and the pervasive device communicate through a wireless  
3 access point.

1 33. The method according to Claim 2, wherein:

2 the locations comprise address information for each  
3 determined data manipulation operation;

4 the requesting operation step further comprises issuing a  
5 request using the address information of the selected data  
6 manipulation operation; and

7 the performing step further comprises executing a service  
8 which is located using the address information of the issued  
9 request.

1 34. The method according to Claim 1, wherein the returning step  
2 further comprises returning at least one graphical symbol or  
3 icon for particular ones of the returned data manipulation  
4 operations and locations.

1 35. The method according to Claim 1, wherein the determining  
2 step further comprises accessing a data structure to locate  
3 information used by the returning step, wherein the data  
4 structure stores information about the data manipulation



5 operations that are available for the obtained data and the  
6 location of each available data manipulation operation.

1 36. The method according to Claim 35, wherein new data  
2 manipulation operations are supported for use in the determining  
3 step by adding information about the new data manipulation  
4 operations and the location of each new data manipulation  
5 operation to the data structure.

1 37. The method according to Claim 1, wherein the determining  
2 step further comprises:  
3 accessing a data structure to locate information used by  
4 the returning step, wherein the data structure stores  
5 information about the data manipulation operations that are  
6 available for the obtained data; and  
7 dynamically determining the location of each available data  
8 manipulation operation.

1 38. The method according to Claim 37, wherein the dynamically  
2 determining step further comprises evaluating at least one of  
3 current processor load and current network conditions.

1 39. The method according to Claim 2, wherein the requesting  
2 step is performed by a user of the pervasive device.

1 40. The method according to Claim 2, wherein the requesting  
2 step is performed programmatically without intervention of a  
3 user of the pervasive device.

1 41. The method according to Claim 2, further comprising the  
2 step of programmatically requesting, by a protocol proxy, a  
3 selected data manipulation operation on the obtained data, and  
4 wherein the returning step returns a result of the selected data  
5 manipulation operation as the obtained data.

1 42. The method according to Claim 1, further comprising the  
2 step of automatically invoking one or more of the determined  
3 data manipulation operations.

1 43. The method according to Claim 42, wherein the automatically  
2 invoking step operates before the returning step.

1 44. The method according to Claim 1, further comprising the  
2 steps of:

3           determining one or more selected data manipulation  
4       operations that should be performed automatically on the  
5       obtained data;  
6           performing the selected data manipulation operations on the  
7       obtained data, thereby creating transformed data; and  
8           using the transformed data as the obtained data for the  
9       step of determining what data manipulation operations are  
10      available.

1 45. The method according to Claim 2, further comprising the  
2 step of dispatching the requested operation, by a manager which  
3 receives the operation request, to the other device prior to  
4 operation of the performing step.

1 46. The method according to Claim 45, further comprising the  
2 step of passing information to the manager along with the  
3 operation request, wherein the passed information enables the  
4 manager to ensure that the performing step operates on data  
5 which is identical to the returned data.

1 47. The method according to Claim 46, wherein the passed  
2 information comprises one or more cookies which are present in a  
3 header of the data access request.

1 48. The method according to Claim 1, wherein operation of the  
2 steps requires no additional software on the pervasive device.

1 49. The method according to Claim 1, wherein operation of the  
2 steps requires no additional hardware on the pervasive device.

1 50. A system for enabling data access and manipulation from a  
2 pervasive device, comprising:

3 means for receiving a data access request from a pervasive  
4 device;

5 means for obtaining the requested data;

6 means for determining what data manipulation operations are  
7 available for the obtained data, as well as a location of each  
8 available data manipulation operation; and

9 means for returning the determined data manipulation  
10 operations and locations to the pervasive device, in addition to  
11 the obtained data.

1 51. The system according to Claim 50, further comprising:

2 means for requesting operation of a selected one of the  
3 determined data manipulation operations; and

means for performing the requested operation, wherein the means for performing is executed by another device on behalf of the pervasive device.

52. Computer program instructions for enabling data access and manipulation from a pervasive device, the computer program instructions embodied on one or more computer readable media and comprising:

computer program instructions for receiving a data access request from a pervasive device;

computer program instructions for obtaining the requested data;

computer program instructions for determining what data manipulation operations are available for the obtained data, as well as a location of each available data manipulation operation; and

computer program instructions for returning the determined data manipulation operations and locations to the pervasive device, in addition to the obtained data.

53. The computer program instructions according to Claim 52, further comprising:

3 computer program instructions for requesting operation of a  
4 selected one of the determined data manipulation operations; and  
5 computer program instructions for performing the requested  
6 operation, wherein the means for performing is executed by  
7 another device on behalf of the pervasive device.

1 54. A method of enabling a pervasive device to access and  
2 manipulate remotely-stored data, comprising steps of:

3 receiving a data access request from the pervasive device;

4 obtaining the requested data;

5 determining what data manipulation operations are available  
6 for the obtained data, as well as a location of each available  
7 data manipulation operation; and

8 returning the determined data manipulation operations and  
9 locations to the pervasive device, in addition to the obtained  
10 data.

1 55. A method of accessing and manipulating remotely-stored data  
2 from a pervasive device, comprising steps of:

3 requesting an access of the remotely-stored data from the  
4 pervasive device; and

receiving the requested data at the pervasive device, along  
with information about one or more data manipulation operations  
that have been determined to be available for the obtained data.

56. The method according to Claim 56, wherein the information  
further comprises a location of each available data manipulation  
operation.

57. The method according to Claim 56, further comprising the  
step of requesting operation of a selected one of the data  
manipulation operations.